WHAT IS CLAIMED IS:

1. A method for treating hyperplasia or neoplasia in a body lumen, said method comprising:

cooling an inner surface of the body lumen to a temperature and for a time sufficient to inhibit subsequent cell growth.

2. A method as in claim 1, wherein the body lumen is an artery subject to hyperplasia resulting from treatment of a stenosis.

3. A method as in claim 2, wherein the treatment comprised balloon angioplasty.

4. A method as in claim 2, wherein the cooling step is performed within one hour following treatment of the stenosis.

5. A method as in claim 1, wherein the cooling step comprises lowering the temperature of the luminal surface to from 0°C to -80°C for a time period in the range from 1 second to 10 seconds.

6. A method as in claim 1, wherein the cooling step comprises:

introducing a catheter into the body lumen;

positioning a balloon on the catheter proximate a target site on the inner surface;

expanding a gas within the balloon to cryogenically cool the target site.

7. A method as in claim 6, wherein the expanding step comprises flowing liquid nitrogen to a Joule-Thomson orifice positioned within the balloon so that the nitrogen expands across the orifice.

8. A method as in claim 7, wherein the pressure within the balloon is maintained at from 30 psi to 100 psi and the temperature near the orifice is in the range from -40°C to -100°C.

9. A method as in claim 8, wherein the temperature at each end of the balloon is above 0°C.

10. A method as in claim 6, wherein the balloon has a length of at least 1 cm and the orifice is positioned at least 0.5 cm from each end.

11. A method as in claim 6, wherein the balloon dimensions and the gas expansion conditions are selected to produce a temperature profile over the length of the balloon with a temperature between the ends below 0°C and temperatures at each end above 0°C.

12. A method as in claim 1, wherein the cooling step comprises:

introducing a catheter body into the body lumen;

positioning a balloon on the catheter proximate a target site on the inner surface;

vaporizing a liquid within the balloon to cryogenically cool the target site.

13. A method as in claim 6, further comprising measuring a temperature of the target site with a thermocouple mounted outside the balloon and controlling the gas expansion based on the measured temperature.

14. A cryosurgical catheter for use in a blood vessel having a vessel wall, the cryosurgical catheter comprising:

a flexible catheter body having a proximal end, a distal end, and a lumen defining an axis therebetween;

an axially elongate balloon disposed at the distal end of the catheter body in fluid communication with the lumen, the balloon having a balloon wall that can expand radially to engage the surrounding vessel wall;

a diffuser head having at least one port in fluid communication with a cooling fluid supply, the diffuser head movable axially within the balloon between a first position and a second position.

15. A method for treating a blood vessel having a vessel wall, the method comprising:

introducing a catheter into the blood vessel;

expanding a balloon of the catheter near a target site to engage the vessel wall;

expanding fluid at a first location within the balloon; and

expanding fluid at a second location within the balloon to cryogenically cool at least a portion of the engaged vessel wall, the second location being separated from the first location.

16. The method of claim 15, further comprising moving a diffuser head between the first location and the second location.

17. The method of claim 16, wherein a housing separates the balloon and the vessel wall when the orifice head is at the first location, wherein fluid expansion is initiated at the first location, and wherein the moving step moves ports of the diffuser head from within the housing after a reduction in thermal transients of the gas expansion.

18. The method of claim 15, wherein fluid expansion occurs simultaneously at the first and second locations, the balloon being axially elongate, the first and second locations being separated axially.

19. The method of claim 15, wherein the fluid expansion occurs simultaneously at the first and second locations so that the fluid flows radially toward the vessel wall, the first and second locations being separated circumferentially.

20. The method of claim 15, wherein the first and second expansion steps comprise vaporization of at least a portion of the fluid from a liquid to a gas so that the enthalpy of vaporization cools the at least a portion of the engaged vessel wall.

21. The method of claim 15, wherein the first and second expansion steps are effected by passing the fluid through at least one Joule-Thompson orifice.

22. A method for treating a blood vessel having a vessel wall, the method comprising:

introducing a catheter into the blood vessel;

expanding a balloon of the catheter near a target site within the vessel wall, the balloon having a balloon wall;

cooling the vessel wall with the balloon by coating at least a portion of an inner surface of the balloon wall with a liquid so that the liquid coating vaporizes within the balloon.

23. A system for treating a blood vessel having a vessel wall, the system comprising:

a flexible catheter body having a proximal end and a distal end;

an intravascular balloon disposed near the distal end of the catheter body, the balloon expandable to radially engage a surrounding vessel wall, the balloon having an inner surface; and

a cooling liquid coating at least a portion of the inner surface of the balloon, the cooling liquid vaporizing within the balloon to cool the vessel wall.